ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5395

Sensory analysis of fish protein concentrate

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Original title: Sensorisk analyse av matmjol

In: Sildolje og Sildemelindutriens Forskningsinstitutt, meldinger fra SSF Nr. 3, 1978, p. 32-33

Original language: Norwegian

Available from:
Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1988

6 typescript pages

Secretary of State Secrétariat d'État

90-01545/

MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU BUREAU DES TRADUCTIONS

Client's No.–N° du client	Department – Ministère	Division/Branch – Division/Direction	City – Ville
	DFO	Scientific Publications	
Bureau No.–N° du bureau	**Language – Langue**	**Translator (Initials) – Traducteur (Initiales)**	
3416093	Norwegian	LT	5/7-88

Torger GJEFSEN and Kirsti EIKRE :

SENSORY ANALYSIS OF FISH PROTEIN CONCENTRATE

Experiences based on the use of Norwegian fish protein concentrate (FPC) for human consumption indicate that its properties (taste, odor, etc.) require modification and that a standardization of deliveries to each market has to be carried out.

SSF started to conduct sensory analyses to find out what factors are significant for the modification and standardization work. Four fish species as well as press cake and whole meal, were compared, and besides, two samples of FPC from the same batch were compared after they had been stored for 8 months in Norway and the Philippines respectively. The results showed that the sensory properties depend to a significant degree on the raw material. Other important factors include addition of stickwater, while storage in a tropical climate is not significant. The present article discusses the significance of these results for further work on the modification and standardization of FPC.

The extensive studies on the acceptability of the Norwegian-produced FPC in Africa and Asia have indicated that many factors influence the consumers' attitude towards the product. Their eating habits, their economy, and not least their understanding of what FPC is and how to use it are very significant factors (1 and 2). If a product is to gain good acceptability, it is critical

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that its taste, odor, color, and consistency are attractive. The results collected from the acceptability studies, the sales and other uses of the FPC indicate that these properties may have to be modified after the consumers' wishes. Experiences have also shown that the FPC deliveries going to each market have to be standardized so that taste, odor, etc., vary as little as possible from one delivery to the next.

Sensory properties of FPC

Such modification and standardization require , however, that it be possible to distinguish and describe the different product variants on the basis of their sensory impressions. These impressions are known as the sensory properties of a product, and their description is known as sensory analysis. The sensory analysis must be carried out by a group of suitable and motivated judges who are trained to do the job.

SSF began to conduct sensory analyses of FPC in spring 1978. The day-to-day work was, during the initial period, carried out by Kirsti Eikre, who was associated with the Institute temporarily in connection with a task mainly centering upon use of industrial fish for food (3).

The sensory properties of FPC can be modified by adding different taste enhancers or by making more extensive changes in the production process. However, the most obvious means of modification seem to consist of using different raw materials and varying the quantity of the stickwater concentrate added. Therefore, the aim of the sensory analysis work was to find out if the taste of FPC was influenced to a noticeable degree by variations in the raw material type and the stickwater quantity. As it was assumed that storage in the tropics may change the sensory properties of FPC, this factor also was studied. These three circumstances are assumed to have possible significance for the product standardization work as well.

Preparation and presentation of samples

Preparations were made for the sensory analyses to take place. A room was fitted with "cubicles" for 8 judges, as shown in the photos. Ten suitable tasters were chosen from among the Institute employees. The last preparatory task consisted of inventing a suitable method for presenting the samples to the judges. Several methods were evaluated. Finally, it was decided to lay emphasis on presenting the samples in a form that would accentuate their sensory properties rather than testing them in a regular dish. Therefore, each FPC portion was mixed with 0.8 parts potato mash powder and 6 parts boiling water. Color differences between the samples were camouflaged with caramel.

During the trials, the judges were given 3 samples at a time, of which 2 were the same. They were then asked to point out the one that was different and to comment on whether the difference was great or small and also preferably to describe the samples. Each comparison was carried out by 8 judges and repeated 3 times. The samples compared differed from each other with regard to the fish species used, the quantity of stickwater added, and their storage country and climate.

Thus, capelin meal was compared with that manufactured from pollack, brisling, and mackerel. The last-mentioned comparison was carried out both with meal ground by the regular method and with micronized meal. All FPC samples, based on the different fish species, were manufactured in regular plants. The press cake meal, which was to be used for a study of the significance of the stickwater, was made by the pilot plant of the SSF from one and the same capelin batch under conditions as uniform as possible. The last comparison was carried out on two samples from the same brisling meal batch packaged in Joy-fish bags (aluminium foil and polyethylene). They had been stored for 8 months in Norway and the Philippines, respectively, in warehouses with non-regulated indoor climates.

Results

An evaluation of the results shown in Table 1 must take into consideration that any chance tip may lead to having a correct answer to a third of the cases (i.e. 8 in the present study). Therefore, the judgment of whether a difference is statistically significant or not must be based on tables where this circumstance is considered.

Table 1 Results of sensory analyses of FPC

Product	Correct answers out of 24 possible	Statistically significant difference
Capelin meal/pollack meal	23	Yes
Capelin meal/brisling meal	20	Yes
Capelin meal/mackerel meal	18	Yes
Capelin meal/mackerel meal micronized	17	Yes
Whole meal/press cake meal	22	Yes
Meal stored in Norway and in the Philippines	10	No

According to the comments noted down by the judges, the differences between the FPCs made from capelin and those made from brisling were characterized by most judges as relatively great, while the differences were judged to be relatively small for the other samples, in spite of the fact that on the basis of the figures, it was pollack meal that was in most cases distinguishable from capelin meal.

The most important conclusion to be drawn from the study is that if consumers in each market are to have a standardized product, no changes should be made in the fish species of which a meal is produced, and that capelin, brisling, and pollack should not replace each other. As stickwater was tested in very few samples, only cautious conclusions can be made in this respect. However, the results indicate that it is possible to modify the taste of FPC by varying the quantity of stickwater added. This is an area to be studied further. Also the effect of storage in a warm climate on the sensory properties of FPC must be studied, with several meal samples made of different fish species and stored in several types of packages.

Literature

2. Gjefsen, T. FAO's acceptability study of FPC concluded. "Notices from SSF" (Meldinger fra SSF) No. 1, 1978.

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